# Cisco Catalyst 4500E Series Chassis

High Performance, Mobile and Secure User Experience

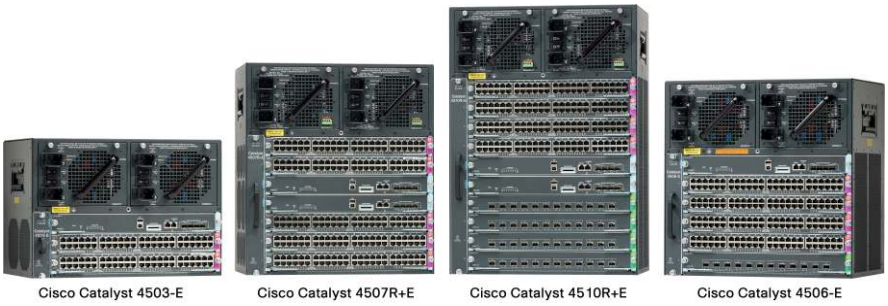
## Overview

The Cisco® Catalyst® 4500 Series Switches enable borderless networks, providing high performance, mobile, and secure user experience through Layer 2-4 switching investments. It enables security, mobility, application performance, video, and energy savings over an infrastructure that supports resiliency, virtualization, and automation. Cisco Catalyst 4500 Series Switches provide borderless performance, scalability, and services with reduced total cost of ownership and superior investment protection.

Cisco Catalyst 4500 (Figure 1) has a centralized forwarding architecture that enables collaboration, virtualization, and operational manageability through simplified operations. With forward and backward compatibility spanning multiple generations, the new Cisco Catalyst 4500E Series provides exceptional investment protection and deployment flexibility to meet the evolving needs of organizations of all sizes. The Cisco Catalyst 4500E Series platform has 10 Gigabit Ethernet (GE) uplinks and supports PoEP, enabling the customers to future proof their network.

E-Series chassis come in four different form factors: 3-slot (4503-E), 6-slot (4506-E), 7-slot (4507R+E/4507R-E), and 10-slot (4510R+E/4510R-E). 4503-E, 4506-E, 4507R+E, and 4510R+E chassis are extremely flexible and support either 6 Gbps, 24 Gbps, or 48Gbps per line-card slot. 4507R-E and 4510R-E chassis are limited to 6 Gbps and 24 Gbps per line-card slot. Integrated resiliency in the Cisco Catalyst 4500E Series includes 1+1 supervisor engine redundancy (10-slot and 7-slot only), redundant fans, software-based fault tolerance, and 1+1 power supply redundancy. Integrated resiliency in both hardware and software minimizes network downtime, helping to ensure workforce productivity, profitability, and customer success.

**Figure 1.** Cisco Catalyst 4500E Series




The Cisco Catalyst 4500E Series extends control to the network edge with intelligent network services, including sophisticated quality of service (QoS), predictable performance, advanced security, comprehensive management, and integrated resiliency. Scalability of these intelligent network services is made possible with dedicated, specialized resources known as ternary content-addressable memory (TCAM). Ample TCAM resources (up to 384,000 entries) enable “high feature capacity,” which provides wire-speed routing/switching performance independent of provisioning of services such as QoS and security.

## Cisco Catalyst 4500E Series Chassis

The Cisco Catalyst 4500E Series offers four chassis options and eight supervisor engine options (Table 1). It provides a common architecture that can scale up to 388 ports. The Cisco Catalyst WS-C4507R+E, WS-C4510R+E, WS-C4507R-E, and WS-C4510RE offer high availability by supporting 1+1 redundant supervisor engines with subsecond failover time and full-image In-Service Software Upgrades (ISSUs). Nonstop forwarding with Stateful Switchover (NSF/SSO) and ISSU help ensure continuous packet forwarding during supervisor engine switchover to help ensure high availability for collaboration applications and voice over IP (VoIP). Using the same line cards as the widely deployed Cisco Catalyst 4000 Series Switches and classic Cisco Catalyst 4500 Series Switches, the Cisco Catalyst 4500E Series furthers Cisco's commitment to affordable enterprise and branch scalability.

**Table 1.** Cisco Catalyst 4500E Series Chassis Features

| Feature | Cisco Catalyst WS-C4503-E Chassis | Cisco Catalyst WS-C4506-E Chassis | Cisco Catalyst WS-C4507R+E Chassis | Cisco Catalyst WS-C4510R+E Chassis |
|---|---|---|---|---|
| **Total number of slots** | 3 | 6 | 7 | 10 |
| **Line-card slots** | 2 | 5 | 5 | 8 |
| **Supervisor engine slots** | 1[1] | 1[1] | 2[2] | 2[3] |
| **Dedicated supervisor engine slot numbers** | 1 | 1 | 3 and 4 | 5 and 6 |
| **Supervisor engine redundancy** | No | No | Yes | Yes (Supervisor V-10GE, 6-E and 7-E) |
| **Supervisor engines supported** | Supervisor 7-E<br>Supervisor 6-E<br>Supervisor 6L-E<br>Supervisor V-10GE | Supervisor 7-E<br>Supervisor 6-E<br>Supervisor 6L-E<br>Supervisor V-10GE | Supervisor 7-E<br>Supervisor 6-E<br>Supervisor 6L-E<br>Supervisor V-10GE | Supervisor 7-E<br>Supervisor 6-E<br>Supervisor V-10GE |
| **Bandwidth scalability per line-card slot** | Up to 48 Gbps on all slots | Up to 48 Gbps on all slots | Up to 48 Gbps on all slots | Up to 48 Gbps on all slots |
| **Number of power supply bays** | 2 | 2 | 2 | 2 |
| **AC input power** | Yes | Yes | Yes | Yes |
| **DC Input power** | Yes | Yes | Yes | Yes |
| **Integrated Power over Ethernet** | Yes | Yes | Yes | Yes |
| **Minimum number of power supplies** | 1 | 1 | 1 | 1 |
| **Power supplies supported** | • 1000W AC<br>• 1400W AC<br>• 1300W ACV<br>• 2800W ACV<br>• 4200W ACV<br>• 6000W ACV<br>• 1400W DC (triple input)<br>• 1400W-DC-P | • 1000W AC<br>• 1400W AC<br>• 1300W ACV<br>• 2800W ACV<br>• 4200W ACV<br>• 6000W ACV<br>• 1400W DC (triple input)<br>• 1400W-DC-P | • 1000W AC<br>• 1400W AC<br>• 1300W ACV<br>• 2800W ACV<br>• 4200W ACV<br>• 6000W ACV<br>• 1400W DC (triple input)<br>• 1400W-DC-P | • 1400W AC<br>• 2800W ACV<br>• 4200W ACV<br>• 6000W ACV<br>• 1400W DC (triple input)<br>• 1400W-DC-P |
| **Number of fan-tray bays** | 1 | 1 | 1 | 1 |
| **Location of 19-inch rack mount** | Front | Front | Front | Front |
| **Location of 23-inch rack mount** | Front (option) | Front (option) | Front (option) | Front (option) |

[1] Slot 1 is reserved for supervisor engine only; slots 2 and higher are reserved for line cards.
[2] Slots 3 and 4 are reserved for supervisor engines only in Cisco Catalyst 4507R-E and 4507R+E; slots 1-2 and 5-7 are reserved for line cards.
[3] Slots 5 and 6 are reserved for supervisor engines only in Cisco Catalyst 4510R-E and 4510R+E; slots 1-4 and 7-10 are reserved for line cards.

## Configuration Alternatives

The Cisco Catalyst 4500 Series offers a powerful and flexible network solution that can be built with eight supervisor engine alternatives. Each provides a high-performance, centralized, shared-memory switch fabric, protecting your line-card investment by supporting the addition of optional higher layer engines (Table 2).

**Table 2.** Cisco Catalyst 4500E Series Supervisor Engine Support

| Feature | Cisco Catalyst 4500 Series Supervisor V-10GE | Cisco Catalyst 4500 Series Supervisor 6L-E | Cisco Catalyst 4500 Series Supervisor 6-E | Cisco Catalyst 4500 Series Supervisor 7-E |
|---|---|---|---|---|
| **Cisco Catalyst WS-C4503-E Chassis** | 6Gbps/Slot | 24Gbps/Slot | 24Gbps/Slot | 48Gbps/Slot |
| **Cisco Catalyst WS-C4506-E Chassis** | 6Gbps/Slot | 24Gbps/Slot | 24Gbps/Slot | 48Gbps/Slot |
| **Cisco Catalyst WS-C4507R+E Chassis** | 6Gbps/Slot | 24Gbps/Slot | 24Gbps/Slot | 48Gbps/Slot |
| **Cisco Catalyst WS-C4510R+E Chassis** | 6Gbps/Slot | Not supported | 24Gbps/slot : Slots 1,2,3,4,7<br>6Gbps/slot : Slots 8,9,10 | 48Gbps/Slot |
| **Cisco Catalyst WS-C4507R-E Chassis** | 6Gbps/Slot | 24Gbps/Slot | 24Gbps/Slot | 24Gbps/slot |
| **Cisco Catalyst WS-C4510R-E Chassis** | 6Gbps/Slot | Not supported | 24Gbps/slot : Slots 1,2,3,4,7<br>6Gbps/slot : Slots 8,9,10 | 24Gbps/slot |

The Cisco Catalyst 4500 Series has flexible interface types and port densities that allow network configurations to be mixed and matched to meet the specific needs of campus networks (Table 3).

**Table 3.** Cisco Catalyst 4500 Series Port Densities

| Cisco Catalyst 4500 Series Switching Modules | Number of Interfaces Supported per Line Card | Cisco Catalyst 4503-E | Cisco Catalyst 4506-E | Cisco Catalyst 4507R+E | Cisco Catalyst 4510R+E |
|---|---|---|---|---|---|
| **Switched 10/100 Fast Ethernet (RJ-45)** | 48 | 96 | 240 | 240 | 384 |
| **Switched 10/100 Fast Ethernet (RJ-45) with IEEE 802.3af at Power over Ethernet (PoE/PoEP)** | 48 | 96 | 240 | 240 | 384 |
| **Switched 100 FX Fast Ethernet (MT-RJ)** | 48 | 96 | 240 | 240 | 384 |
| **Switched 1000BASE-X (fiber)** | 6, 18, or 48 | 104 | 244 | 244 | 388 |
| **Switched 10/100/1000BASE-T Gigabit Ethernet** | 48 | 108 | 240 | 240 | 384 |
| **Switched 10/100/1000BASE-T Gigabit Ethernet with IEEE 802.3af at PoE/PoEP** | 48 | 108 | 240 | 240 | 384 |
| **Switched 10 Gigabit Ethernet** | 6 or 12 | 28 | 64 | 64[6] | 100[4] |

## Configuration Flexibility and Modular Superiority

Cisco Catalyst 4500 Series line cards can be mixed and matched to suit numerous LAN access, server connectivity, SMB, or branch-office deployments. The Cisco Catalyst 4500 Series supports the following line cards, listed in Table 4 by part number.

**Table 4.** Cisco Catalyst 4500 Series Line Cards

| Product Number | Description |
|---|---|
| **Cisco Catalyst 4500E Series Line Cards** | |
| **WS-X4748-RJ45V+E** | Cisco Catalyst 4500E Series 48-Port 802.3at PoEP 10/100/1000 (RJ-45) |
| **WS-X4712-SFP+E** | Cisco Catalyst 4500E Series 12-port 10 Gigabit Ethernet (SFP+) |
| **WS-X4624-SFP-E** | Cisco Catalyst 4500E Series 24-port GE (SFP) |

[4] WS-C4507R-E and WS-C4510R-E chassis support up to 34 switched 10 Gigabit Ethernet ports.

| Product Number | Description |
|---|---|
| **WS-X4612-SFP-E** | Cisco Catalyst 4500E Series 12-port GE (SFP) |
| **WS-X4648-RJ45V-E** | Cisco Catalyst 4500E Series 48-Port PoE 10/100/1000(RJ45) |
| **WS-X4648-RJ45V+E** | Cisco Catalyst 4500E Series 48-Port Premium PoE 10/100/1000(RJ45) |
| **WS-X4606-X2-E** | Cisco Catalyst 4500E Series 6-Port 10GE (X2) |
| **WS-X4648-RJ45-E** | Cisco Catalyst 4500E Series 48-Port Data 10/100/1000(RJ45) |
| **Cisco Catalyst 4500 Classic 10/100 Line Cards** | |
| **WS-X4148-RJ** | Cisco Catalyst 4500 10/100 Auto Module, 48-Port (RJ-45) |
| **WS-X4248-RJ45V** | Cisco Catalyst 4500 PoE 802.3af 10/100, 48-Port (RJ-45) |
| **Cisco Catalyst 4500 Classic 10/100/1000 Line Cards** | |
| **WS-X4548-GB-RJ45** | Cisco Catalyst 4500 Enhanced 48-Port 10/100/1000 Module (RJ-45) |
| **WS-X4548-RJ45V+** | Cisco Catalyst 4500 48-Port 802.3af PoE and 802.3at PoEP 10/100/1000 (RJ-45) |
| **WS-X4548-GB-RJ45V** | Cisco Catalyst 4500 PoE IEEE 802.3af 10/100/1000, 48 Ports (RJ-45) |
| **Cisco Catalyst 4500 Classic 100 BASE-X FE Line Cards** | |
| **WS-X4248-FE-SFP** | Cisco Catalyst 4500 Fast Ethernet Switching Module, 48-Port 100BASE-X (SFP) |
| **Cisco Catalyst 4500 Classic 1000 BASE-X GE Line Cards** | |
| **WS-X4306-GB** | Cisco Catalyst 4500 Gigabit Ethernet Module, 6 Ports (GBIC) |
| **WS-X4506-GB-T** | Cisco Catalyst 4500 6-Port 10/100/1000 RJ-45 PoE IEEE 802.3af and 1000BASE-X (SFP) |
| **WS-X4418-GB** | Cisco Catalyst 4500 Gigabit Ethernet Module, Server Switching 18 Ports (GBIC) |
| **WS-X4448-GB-SFP** | Cisco Catalyst 4500 Gigabit Ethernet Module, 48 Ports 1000X (SFP) |

Table 5 lists the minimum software requirements for the Cisco Catalyst 4500 supervisor engines.

**Table 5.** Cisco Catalyst Supervisor Engine Software Minimum Requirements

| Chassis | Supervisor Engine | Minimum Software Requirement |
|---|---|---|
| **Cisco WS-C4503-E and WS-C4506-E** | Supervisor Engine V-10GE<br>Supervisor Engine 6-E<br>Supervisor Engine 6L-E<br>Supervisor Engine 7-E | Cisco IOS® Software Release 12.2(37)SG<br>Cisco IOS Software Release 12.2(40)SG<br>Cisco IOS Software Release 12.2(52)SG<br>Cisco IOS XE Software Release 3.0(1)SG |
| **Cisco WS-C4507R+E** | Supervisor Engine V-10GE<br>Supervisor Engine 6-E<br>Supervisor Engine 6L-E<br>Supervisor Engine 7-E | Cisco IOS Software Release 12.2(54)SG<br>Cisco IOS Software Release 12.2(54)SG<br>Cisco IOS Software Release 12.2(54)SG<br>Cisco IOS XE Software Release 3.0(1)SG |
| **Cisco WS-C4510R+E** | Supervisor Engine V-10GE<br>Supervisor Engine 6-E<br>Supervisor Engine 7-E | Cisco IOS Software Release 12.2(54)SG<br>Cisco IOS Software Release 12.2(54)SG<br>Cisco IOS XE Software Release 3.0(1)SG |
| **Cisco WS-C4507R-E** | Supervisor Engine V-10GE<br>Supervisor Engine 6-E<br>Supervisor Engine 6L-E<br>Supervisor Engine 7-E | Cisco IOS Software Release 12.2(40)SG<br>Cisco IOS Software Release 12.2(40)SG<br>Cisco IOS Software Release 12.2(52)SG<br>Cisco IOS XE Software Release 3.0(1)SG |
| **Cisco WS-C4510R-E** | Supervisor Engine V-10GE<br>Supervisor Engine 6-E<br>Supervisor Engine 7-E | Cisco IOS Software Release 12.2(40)SG<br>Cisco IOS Software Release 12.2(40)SG<br>Cisco IOS XE Software Release 3.0(1)SG |

## Managing the Catalyst 4500E Series Switch

Network Management applications are instrumental in lowering Operating Expenditures (OPEX) while improving network availability by simplifying and automating many of the day-to-day tasks associated with managing an end-to-end network.

### Cisco Network Assistant

The Cisco Network Assistant application manages standalone devices from anywhere on your intranet. Using its GUI, you can perform multiple configuration tasks without using command-line interface (CLI) commands. You can apply actions to multiple devices and ports at the same time for VLAN and quality-of-service (QoS) settings, inventory and statistics reports, link and device monitoring, software upgrades, and many other networking features.

Cisco Network Assistant simplifies device management by offering an intuitive GUI, alternative modes for configuring network devices, two levels of access, and comprehensive online help. It features two modes of display: device view and topology view. In the device view, the Cisco Catalyst 4500 Series administrator may configure the switch, configure ports on the switch, or configure groups of ports. In the topology view, the administrator may configure VLAN settings, configure EtherChannels, and view a variety of reports on system and network status.

### CiscoWorks LAN Management Solution

CiscoWorks LAN Management Solution (LMS) is an integrated suite of management functionality that simplify the configuration, administration, monitoring, and troubleshooting of Cisco Borderless Networks. Built upon popular Internet-based standards, CiscoWorks LMS enables network operators to manage the network through a browser-based interface that can be accessed anytime from anywhere within the network. The user experience allows for maximum flexibility and quick-and-easy access to management functions and tasks reducing complexity and error-prone tasks typically associated with managing a network. The breadth and depth of device support coupled with “day-one” device support program ensures that the 4500E Series Switch and the latest Cisco platforms are supported and manageable the day they ship.

Once installed, out-of-the-box monitoring and troubleshooting dashboards provide immediate results and actionable information to quickly isolate and fix network problems before they are service impacting. Work centers provide a single place where operators can quickly provision, monitor and manage new Cisco Catalyst 4500E Series Switch value-added network services such as: Cisco EnergyWise, Cisco TrustSec™, and AutoSmart Ports.

### Network Analysis Module

Cisco NAM 2200 series appliance provides comprehensive operational visibility into Cisco Catalyst 4500 Series Switch deployments. It combines application performance visibility, traffic analysis and troubleshooting, to enable network administrators to effectively manage delivery of converged network services. The visibility provided by NAM allows IT to deliver consistent end-user experience and improve service levels. It also helps to optimize resources with comprehensive analysis of traffic and effective use of intelligent network services such as QoS and Cisco WAAS. In addition, Cisco NAM improves operational efficiency with proactive detection of performance issues and accelerated problem isolation and root-cause analysis

## Physical Specifications

Table 6 lists physical specifications.

**Table 6.** Physical Specifications of Cisco Catalyst 4500 Series Chassis

| Specification | WS-C4503-E | WS-C4506-E | WS-C4507R+E and WS-C4507R-E | WS-C4510R+E and WS-C4510R-E |
|---|---|---|---|---|
| **Dimensions (H x W x D)** | 12.25 x 17.31 x 12.50 in. (31.12 x 43.97 x 31.70 cm) | 17.38 x 17.31 x 12.50 in. (44.13 x 43.97 x 31.70 cm) | 19.19 x 17.31 x 12.50 in. (48.74 x 43.97 x 31.70 cm) | 24.35 x 17.31 x 12.50 in. (61.84 x 43.97 x 31.70 cm) |
| **Rack units (RU)** | 7 RU | 10 RU | 11 RU | 14 RU |
| **Chassis weight (with fan tray)** | 32.25 lb (14.63 kg) | 40.50 lb (18.37 kg) | 44.50 lb (20.19 kg) | 54.50 lb (24.73 kg) |
| **Mounting** | 19- and 23-in. rack compatible (19-in. rack and cable guide hardware included) | 19- and 23-in. rack compatible (19-in. rack and cable guide hardware included) | 19- and 23-in. rack compatible (19-in. rack and cable guide hardware included) | 19- and 23-in. rack compatible (19-in. rack and cable guide hardware included) |

## Power Supply Indicators and Interfaces

Tables 7 and 8 describe power supply indicators and interfaces:

- Fan cooling: Integrated in hot-insertion/hot-extraction unit
- Good: Green
- Fail: Red (faulty)
- SNMP MIB supported

**Table 7.** Cisco Catalyst 4500E Series Power Supply Specifications (Data Only)

| Power Supply | 1000W AC | 1400W AC | 1400W DC Triple Input |
|---|---|---|---|
| **Integrated PoE** | No (data only) | No (data Only) | No (data only) |
| **Input current (rated)** | 12A at 100 VAC, 5A at 240 VAC | 16A at 100 VAC, 7A at 240 VAC | 2x -48 VDC at 15A<br>1x -48 VDC at 12.5A |
| **Output current (data)** | • 12V at 83.4A<br>• 3.3V at 12.2A | • 12V at 113.4A<br>• 3.3V at 12.2A | • 12V at 1360W<br>• 3.3V at 40W |
| **Output power redundant mode (data)** | 1000W + 40W | 1360W + 40W | 1400W + 40W |
| **Output power combined mode (data)** | 1667W | 2473W | - |
| **Heat dissipation** | 943 Btus per hour | 1048 Btus per hour | 1048 Btus per hour |
| **Holdup time** | 20 ms | 20 ms | 20 ms |
| **Hot swappable** | Yes | Yes | Yes |

**Table 8.** Cisco Catalyst 4500E Series Power Supply Specifications (Data and PoE)

| Power Supply | 1300W AC | 2800W AC | 4200W AC | 6000 AC | 1400W DC with PEM | 2500W AC - Power Shelf |
|---|---|---|---|---|---|---|
| **Integrated PoE** | Yes (up to 800W) | Yes (up to 1400W) | Yes (up to 3855W) | Yes (up to 4800W) | Up to 7500W (minus the power consumed for data) when connected directly to a DC power plant or 2 external AC power shelves | 2500W per power supply; 5000W per shelf (minus the power consumed for data) |
| **IEEE 802.3af/at compliant PoE/PoEP** | Yes | Yes | Yes | Yes | Yes | Yes |
| **Input current (rated)** | • 16A at 100 VAC<br>• 7A at 240 VAC | 16A at 200 VAC | • 2x 12A at 100VAC<br>Or<br>• 2x 12A at 200VAC | • 2x 12A at 100VAC<br>Or<br>• 2x 16A at 200VAC | • 31A at -60 VDC (data only)<br>• 180A at -48 VDC (PoE) | 15A at 200 VAC |
| **Output current (data)** | • 12V at 84.7A<br>• 3.3V at 12.5A | • 12V at 113.3A<br>• 3.3V at 12.1A | • 12V at 115.3A<br>• 3.3V at 12.5A | • 12V at 186.9A<br>• 3.3V at 12.5A | • 12V at 120A<br>• 3.3V at 10A | -52 VDC at 50A (total output per supply) |
| **Output current (PoE)** | -50V at 16.7A | -50V at 28A | -50V at 77.1A (200V)<br>-50V at 38A (100V) | -50V at 100.0A (200V)<br>-50V at 38.5A (120V) | 140A at -48/-60 VDC | -52 VDC at 50A (total output per supply) |
| **Output power redundant mode (data)** | 1000W + 40W | 1360W + 40W | 1383W + 40W | 2200W + 40W | 1360W + 40W | Up to 1400W (through DC supply) |
| **Output power redundant mode (PoE)** | 800W maximum per power supply | 1400W maximum per power supply | • 3700W (220V)<br>• 1850W (110V) | • 4800W (220V)<br>• 1850W (110V) | Up to 7500W (minus the power consumed for data) | 2500W per supply (minus the power consumed for data) |
| **Output power combined mode (data)** | 1667W | 2473W | 2766W | 4400W | - | - |

| Power Supply | 1300W AC | 2800W AC | 4200W AC | 6000 AC | 1400W DC with PEM | 2500W AC - Power Shelf |
|---|---|---|---|---|---|---|
| **Output power combined mode (PoE)** | 1333W | 2333W | 6700W (220V)<br>3360W (110V) | 8700W (220V)<br>3360W (110V) | 3800W (100V) | - |
| **Heat dissipation** | 1568 Btus per hour | 2387 Btus per hour | 3580 BTU/hr | 2720 BTU/hr | Data only: 1591 Btus per hour<br>Data and voice: 2905 Btus per hour | 1210 Btus per hour, per power supply |
| **Holdup rime** | 20 ms | 20 ms | 20 ms | 20 ms | 4 ms | 20 ms |
| **Hot swappable** | Yes | Yes | Yes | Yes | Yes | Yes |

Additional notes for Table 7 and 8:

- Output power is per power supply unless otherwise stated
- Heat dissipation numbers represent the power-conversion losses of the power supply in operation
- The number of power devices supported will depend on customer configuration

## Fan Trays

Each Cisco Catalyst 4500E Series and classic Cisco Catalyst 4500 Series chassis uses a single fan tray for cooling. All fan trays are composed of independent fans. If one fan fails, the system will continue to operate without a significant degradation in cooling. The system will detect and notify the user (through LED, command-line interface [CLI], and SNMP) that a fan has failed and the tray needs to be replaced. Cisco Catalyst 4500E Series fans cannot be interchanged with classic Cisco Catalyst 4500 Series fans. The classic Cisco Catalyst 4500 Series chassis needs an E-Series fan tray in order to support the Metro Supervisor Engine 6-E.

## Fabric-Redundancy Modules (Cisco WS-C4507R+E, WS-C4510R+E, WS-C4507R-E, and WS-C4510R-E Only)

The Cisco Catalyst 4500 and 4500E Series redundancy scheme uses removable fabric-redundancy modules on the passive backplane to switch traffic to the active supervisor engine. There is one fabric-redundancy module per line card. Fabric-redundancy modules and redundant clocks ship standard with every Cisco Catalyst 4507R+E, 4507R-E, 4510R+E, and 4510R-E chassis. Fabric-redundancy modules cannot be interchanged between the Cisco Catalyst 4507R+E/4510R+E and 4507R-E/4510R-E chassis.

## Environmental Conditions

The Cisco Catalyst 4500 and 4500E Series require the following conditions:

- Operating temperature: 32 to 104ºF (0 to 40ºC)
- Storage temperature: -40 to 167ºF (-40 to 75ºC)
- Relative humidity: 10 to 90 percent, noncondensing
- Operating altitude: -60 to 2000 meters (m)

## Regulatory Standards Compliance

Table 9 lists the regulatory standards compliance of the Cisco Catalyst 4500 and 4500E Series.

**Table 9.** Regulatory Standards Compliance

| Specification | Standard |
|---|---|
| **Regulatory compliance** | CE Marking |
| **Safety** | • UL 60950<br>• CAN/CSA-C22.2 No. 60950 |

| Specification | Standard |
|---|---|
| | • EN 60950<br>• IEC 60950<br>• TS 001<br>• AS/NZS 3260 |
| **EMC** | • FCC Part 15 (CFR 47) Class A<br>• ICES-003 Class A<br>• EN55022 Class A<br>• CISPR22 Class A<br>• AS/NZS 3548 Class A<br>• VCCI Class A<br>• EN 55022<br>• EN 55024<br>• EN 61000-6-1<br>• EN 50082-1<br>• EN 61000-3-2<br>• EN 61000-3-3<br>• ETS 300 386 |
| **Industry EMC, safety, and environmental standards** | • NEBS Level 3<br>• ETS 300 019 Storage Class 1.1<br>• ETS 300 019 Transportation Class 2.3<br>• ETS 300 019 Stationary Use Class 3.1<br>• ETS 300 386 |
| **Telecom (E1)** | • CTR 12/13<br>• CTR 4<br>• ACA TS016 |
| **Telecom (T1)** | • FCC Part 68<br>• Canada CS-03<br>• JATE Green Book |
| **ROHS Compliance** | ROHS5 |

## Power and MTBF Information

Table 10 gives power and MTBF information for different chassis

**Table 10.** Power and MTBF Info

| Part Number | Max Rated Power (W) | Rated MTBF (Hours) |
|---|---|---|
| **WS-C4503-E** | 60 | 1,064,279 |
| **WS-C4506-E** | 120 | 710,119 |
| **WS-C4507R+E** | 135 | 248,630 |
| **WS-C4510R+E** | 200 | 179,714 |
| **WS-C4507R-E** | 135 | 365,896 |
| **WS-C4510R-E** | 200 | 290,525 |

**Note:**

All power numbers shown in the table above are maximum values recommended for facility power and cooling capacity planning. These figures are not indicative of the actual power draw during operation. Typical power draw is about 20% lower than the maximum value shown.

## Ordering Information

Table 11 lists the ordering information for chassis, power supplies, supervisor engines, and memory that are commonly used with the Cisco Catalyst 4500 Series.

**Table 11.** Ordering Information

| Product Number | Description |
|---|---|
| **WS-C4503-E** | Cisco Catalyst E-Series 4503 switch (3-slot chassis), fan, no power supply |
| **WS-C4506-E** | Cisco Catalyst E-Series 4506 switch (6-slot chassis), fan, no power supply |
| **WS-C4507R-E** | Cisco Catalyst E-Series 4507R switch (7-slot chassis), fan, no power supply, redundant supervisor capable |
| **WS-C4507R+E** | Cisco Catalyst E-Series 4507R+E switch (7-slot chassis), fan, no power supply, redundant supervisor capable |
| **WS-C4510R-E** | Cisco Catalyst E-Series 4510R switch (10-slot chassis), fan, no power supply; redundant supervisor capable |
| **WS-C4510R+E** | Cisco Catalyst E-Series 4510R+E switch (10-slot chassis), fan, no power supply; redundant supervisor capable |
| **PWR-C45-1000AC** | Cisco Catalyst 4500 Series 1000W AC power supply (data only) |
| **PWR-C45-1400AC** | Cisco Catalyst 4500 Series 1400W AC power supply (data only) |
| **PWR-C45-1300ACV** | Cisco Catalyst 4500 Series 1300W AC power supply (with integrated PoE) |
| **PWR-C45-2800ACV** | Cisco Catalyst 4500 Series 2800W AC power supply (with integrated PoE) |
| **PWR-C45-4200ACV** | Cisco Catalyst 4500 Series 4200W AC power supply (with integrated PoE) |
| **PWR-C45-6000ACV** | Cisco Catalyst 4500 Series 6000W AC power supply (with integrated PoE) |
| **PWR-C45-1400DC-P** | Cisco Catalyst 4500 Series 1400W DC power supply with integrated power entry module (PEM) |
| **PWR-C45-1400DC** | Cisco Catalyst 4500 Series triple input 1400W DC power supply (data only) |
| **WS-P4502-1PSU** | Cisco Catalyst 4500 Series auxiliary power shelf (2-slot), including 1 PWR-4502 |
| **PWR-4502** | Cisco Catalyst 4500 Series auxiliary power-shelf redundant power supply |
| **WS-X4013+** | Cisco Catalyst 4500 Series Supervisor Engine II-Plus |
| **WS-X4013+TS** | Cisco Catalyst 4500 Series Supervisor Engine II-Plus-TS, twelve 10/100/1000 PoE (RJ-45) and eight 1000-X SFP ports included on supervisor-engine faceplate |
| **WS-X4013+10GE** | Cisco Catalyst 4500 Series Supervisor Engine II-Plus-10GE |
| **WS-X4515** | Cisco Catalyst 4500 Supervisor Engine IV |
| **WS-X4516** | Cisco Catalyst 4000 and 4500 Supervisor Engine V |
| **WS-X4516-10GE** | Cisco Catalyst 4500 Series Supervisor Engine V-10GE |
| **WS-X45-Sup6-E** | Cisco Catalyst 4500 Series Supervisor Engine 6-E |
| **WS-X45-Sup6L-E** | Cisco Catalyst 4500 Series Supervisor Engine 6L-E |
| **MEM-C4K-FLD64M** | Compact Flash memory, 64-MB option |
| **MEM-C4K-FLD128M** | Compact Flash memory, 128-MB option |
| **MEM-X45-512MB-E** | Cisco Catalyst 4500 Series Supervisor Engine 6-E, 512-MB option |

## Warranty

Cisco Catalyst 4500E Series and Cisco Catalyst 4500 switches are covered by the Cisco limited lifetime hardware warranty. For more information, visit http://www.cisco.com/en/US/docs/general/warranty/English/LH2DEN__.html.

**Note:** If you purchased a Cisco Catalyst 4500 Series chassis before May 1, 2009, it is covered by the Cisco 90-day limited hardware warranty. For more information, visit http://www.cisco.com/en/US/docs/general/warranty/English/901DEN__.html.

## Cisco Technical Support Services

Cisco offers Cisco Technical Support Services to help ensure that your Cisco products operate efficiently, remain highly available, and benefit from current system software to assist you in effectively managing your network service while controlling operational costs.

Cisco Technical Support Services provide significant benefits that go beyond what is offered under the Cisco warranty policy.

Services available under a Cisco SMARTnet® service contract that are not covered under a warranty include the following:

- Latest software updates
- Rapid replacement of hardware in next-day, 4-hour, or 2-hour dispatch options
- Ongoing technical support through Cisco Technical Assistance Center (TAC)
- Registered access to http://www.cisco.com

Tables 12 and 13 list the components and competitive differentiators of Cisco Technical Support Services.

**Table 12.** Technical Support Services: Components

| Service Feature Overview | Benefits |
|---|---|
| **Software support** | Offers maintenance and minor and major updates for licensed feature set. Downloading new maintenance releases, patches, or updates of Cisco IOS Software helps to enhance and extend the useful life of Cisco devices. Through major software updates it is possible to extend the life of equipment and maximize application technology investments by:<br>• Increasing the performance of current functions<br>• Adding new capability that, in many cases, requires no additional hardware investment<br>• Enhancing network and application availability, reliability, and stability |
| **TAC support** | With more than 1000 highly trained customer support engineers, 390 CCIE® certifications, and access to 13,000 research and development engineers, Cisco TAC complements your in-house staff with a high level of knowledge in voice, video, and data communications networking technology. Its sophisticated call-routing system quickly routes calls to the correct technology personnel. The Cisco TAC is available 24 hours a day, 365 days a year. |
| **Cisco.com** | This award-winning website provides 24-hour access to an extensive collection of online product and technology information, interactive network-management and troubleshooting tools, and knowledge-transfer resources that can help customers reduce costs by increasing staff self-sufficiency and productivity. |
| **Advance hardware replacement** | Advance replacement and onsite field-engineer options supply fast access to replacement hardware and field resources for installing hardware, minimizing the risk of potential network downtime. |

**Table 13.** Technical Support Services: Competitive Differentiators

| Feature | Benefits |
|---|---|
| **Worldwide Virtual Lab**<br>• TAC training<br>• Boot camps<br>• Tech calls | This extensive lab of Cisco equipment and Cisco IOS Software releases provides an invaluable engineering resource and knowledge base for training, product information, and recreation and testing of selected network issues to help decrease time to resolution. |
| **Tech forums** | Cisco is committed to providing customers the latest in technology support. These TAC training programs assist customers in case avoidance as well as provide knowledge transfer of Cisco networking expertise. |
| **Cisco Live** | A powerful suite of Internet-enabled tools with firewall-friendly features; these secure, encrypted Java applets can turn a simple phone call into an interactive collaboration session, allowing a customer and Cisco TAC support engineer to work together more effectively. |
| **Global logistics** | Delivers award-winning, worldwide hardware-replacement support with 650 depots, covering 120 countries, at a US$2.3 billion investment in inventory, using 10,000 onsite field engineers. |
| **Cisco IOS Software** | Employs 100 discrete technologies with more than 2000 features. 400 new features are added each year. Cisco IOS Software is installed in more than 10 million devices and is running on more than 10,000 networks worldwide. It operates on the world's largest IPv6 and VoIP networks and in all major service provider networks worldwide. |

## For More Information

To learn more about how you can take advantage of Cisco Technical Support Services, talk to your Cisco representative or visit Cisco Technical Support Services at http://www.cisco.com/en/US/products/svcs/ps3034/ps2827/serv_category_home.html.

For additional information about the Cisco Catalyst 4500 Series, visit http://www.cisco.com/go/catalyst4500.

For additional information about Cisco products, contact:

- United States and Canada: 800 553-NETS (6387)
- Europe: 32 2 778 4242
- Australia: 612 9935 4107
- Other: 408 526-7209
- http://www.cisco.com

## Cisco and Partner Services for Next-Generation Cisco Catalyst Modular Switches

Enable the borderless network architecture using personalized services from Cisco and our partners. Through a discovery process that begins with understanding your business objectives, we help you integrate the next-generation Cisco Catalyst modular switches into your architecture and incorporate network services onto that platform. Sharing knowledge and leading practices, we support your success every step of the way as you deploy, absorb, manage, and scale new technology. Choose from a flexible suite of support services designed to meet your business needs and help you maintain high-quality network performance while controlling operational costs.

For more information about services from Cisco and our partners, visit http://www.cisco.com/go/services.

Table 14 lists available technical services.

**Table 14.** Available Technical Services

| Technical Services |
|---|
| Cisco SMARTnet® Service<br>• Around-the-clock, global access to the Cisco Technical Assistance Center (TAC)<br>• Unrestricted access to the extensive Cisco.com knowledge base and tools<br>• Next-business-day, 8x5x4, 24x7x4, and 24x7x2 advance hardware replacement and onsite parts replacement and installation available[5]<br>• Ongoing operating system software updates within the licensed feature set[6]<br>• Proactive diagnostics and real-time alerts on Smart Call Home enabled devices |
| Cisco Smart Foundation Service<br>• Next business day advance hardware replacement as available<br>• Business hours access to SMB TAC (access levels vary by region)<br>• Access to Cisco.com SMB knowledge base<br>• Online technical resources through Smart Foundation Portal<br>• Operating system software bug fixes and patches |
| Cisco SP Base Service<br>• Around-the-clock, global access to the Cisco TAC<br>• Registered access to Cisco.com<br>• Next business day, 8x5x4, 24x7x4, and 24x7x2 advance hardware replacement. Return to factory option available[7]<br>• Ongoing operating system software updates[8]<br>• Available direct from Cisco only to qualified service providers |

[5] Advance hardware replacement is available in various service-level combinations. For example, 8x5xNBD indicates that shipment will be initiated during the standard 8-hour business day, 5 days a week (the generally accepted business days within the relevant region), with next business day (NBD) delivery. Where NBD is not available, same day ship is provided. Restrictions apply; please review the appropriate service descriptions for details.
[6] Cisco operating system updates include the following: maintenance releases, minor updates, and major updates within the licensed feature set.

**Americas Headquarters**
Cisco Systems, Inc.
San Jose, CA

**Asia Pacific Headquarters**
Cisco Systems (USA) Pte. Ltd.
Singapore

**Europe Headquarters**
Cisco Systems International BV Amsterdam,
The Netherlands

Cisco has more than 200 offices worldwide. Addresses, phone numbers, and fax numbers are listed on the Cisco Website at **www.cisco.com/go/offices.**



Printed in USA C78-436089-11 02/11